Chapter 8

Multiple Literacies and Environmental Science Education:
Information Communication Technologies in Formal and Informal Learning Environments

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ABSTRACT

A project by James Cook University's School of Education created an online learning environment targeted at rural and regional schools in Far North Queensland. Pre-service teachers worked with practising teachers and children to develop learning activities which were shared through the BirdNet website. The site hosts a wide range of learning activities for bird identification, building school gardens, as well as professional learning tools such as lesson plans and integrated units of work. Project successes indicate that innovation, creativity and place-based learning can support high levels of both ICT and scientific literacy in all participants. The challenges faced included those resulting from technical issues, effects of distance, child-safety provisions for an on-line environment, and entry level of skills for participants. The value of informal learning by pre-service teachers, freed from the formal learning assessment regime, is endorsed as a valid sustainable, strategy which can be adopted by teacher educators.

INTRODUCTION

In Australia, as in many other nations, there is real concern about science education (Ainley, Kos & Nicholas, 2008; Tytler, 2008) especially how to position science as meaningful enterprise for the generation of children presently in primary (elementary) school. Research continues to show children are making decisions about career possibilities by the age of 9 years (Ford, 2007). The Australian

Chief Scientist, Dr Jim Peacock, has written that, in contemporary times, "science education should not be prescriptive - it is about the spark of excitement that stems from discovery ... Teacher confidence and professional development is just as important as student learning materials" (Tytler, 2008, p. 5).

There are similar concerns about information communication technologies (ICTs) education. One report (Anderson, Lankshear, Courtney & Timms, 2008) of geographical disadvantage indicates that not only do studies show school students in rural and regional areas tend to achieve at lower levels than those in large metropolitan areas in the disciplines of science, ICT and mathematics, but that their teachers in rural and regional Australia experience geographical and professional isolation which affects their capacities to address such disparity. Primary teachers in rural and remote areas have much higher levels of unmet need with regards to professional development, resources and collaboration with colleagues than do teachers in regional urban and metropolitan centres particularly in relation to ICTs (Lyons, Cooksey, Panizzon & Pegg, 2005; Tytler, 2008).

In this chapter we discuss a unique project that employed ICTs and digital pedagogies for place-based, environmental science education within a teacher education programme in tropical far northern Queensland, Australia. This online, community project, known as BirdNet (Whitehouse & Hickey, 2007) was managed through the School of Education, James Cook University (JCU) Cairns, and was initially funded by an Australian Schools Innovation in Science, Technology and Mathematics (ASISTM) project grant in 2006/07 (Australian Government Department of Education Employment and Workplace Relations, 2006). The purpose of all ASISTM project grants was to fund innovations for enhancing science, technology and mathematical learning. Innovations were expected to have momentum beyond the point when federal funding finished. The total number of participants over three years

was 65 pre-service teachers enrolled in Education degree programmes, two teacher educators, a project manager, two information technology support technicians, 130 primary students and 17 teachers and principals from nine regional and rural primary schools and one rural environmental education centre.

The original aim of the project was to establish partnerships between a teacher education institution and a suite of geographically diverse primary schools. The project concept was to address the relative isolation of children in small, rural and regional schools, who typically have limited numbers of children of their own age or ability level to interact with during learning activities. Similarly, their teachers may work with one part-time colleague, or two full-time staff, and be unable to attend centrally-located professional development due to the required two or three days absence (some communities are not serviced by air, and staff must drive long distances on unsealed roads). Pre-service teachers were positioned as a motivational force for learning, by bringing their skills, in ICTs and developing knowledge of environmental issues, into classrooms. They were supported by community environmental educators (such as ornithologists and botanists), volunteer organisations, and staff at commercial tourism sites. In the first two years of the project, 14 pre-service teachers accepted the opportunity to develop learning activities about birds and conservation using digital pedagogies. They worked directly in small rural schools with teachers and children and with different university and community groups as opportunities arose. They produced a range of place-relevant, curriculum materials accessible online.

Online communities can be built from formal learning (when pre-service teachers are assessed on their project completion) and informal learning (when community environmental educators work in schools to provide professional development for teachers, children and pre-service teachers). Informal learning is characterised as having

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